

LIST OF FISHES COLLECTED AT PORT LUDLOW, WASHINGTON.*

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(With Plates lxxiv and lxxv.)

This paper records the ichthyological results of the last annual dredging expedition made by the Young Naturalists' Association of Seattle, Washington, and the second in which the author, as an honorary member, has taken part. A camp was established this year near Port Ludlow, on Puget Sound, and all the dredging and other collecting was done in that vicinity.

The report of last year† recorded 141 species known from that region. Five new species and four others hitherto unrecorded are listed in the present paper.

The author wishes to express his indebtedness to Dr. Charles H. Gilbert, whose interest and aid made his work possible.

The following species are described here as new to science. The number after each is the number of the type on the register of the Leland Stanford Jr. University Museum. The new genus is indicated by full face type.

Neoliparis fissuratus. No. 5044.

Artedius asperulus. No. 5046.

Axyrias *harringtoni*. No. 5047.

Icelinus strabo. No. 5045.

Pallasina aix. No. 5040.

Family SQUALIDÆ.

1. *Squalus sucklii* (Girard).

*Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford Jr. University, No. 8.

†"The Fishes of Puget Sound," Jordan & Starks, Proc. Cal. Acad. Sci., 2d Ser., Vol. v, 1895.

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Family RAJIDÆ.

2. *Raja binoculara* (Girard).

Family AMMODYTIDÆ.

3. *Ammodytes personatus* (Girard).

Hundreds of this species were found on the beach one morning at low tide.

Family SPHYRÆNIDÆ.

4. *Sphyræna argentea* (Girard).

Rather rare this far north, but not infrequently taken by the fishermen. Specimens are in the collections of the Young Naturalists that were taken in the vicinity of Seattle.

Family AULORHYNCHIDÆ.

5. *Aulorhynchus flavidus* Gill.

Very common. Several specimens taken with the seine from among the "eel grass."

Family GASTEROSTEIDÆ.

6. *Gasterosteus cataphractus* Pallas.

A few specimens seined on sandy beaches.

Family SYNGNATHIDÆ.

7. *Siphostoma griseolineatum* (Ayres).

Rather common. A dozen or so specimens taken in the seine.

Family STROMATEIDÆ.

8. *Rhombus simillimus* (Ayres).

One specimen seen.

Family EMBIOTOCIDÆ.

9. *Cymatogaster aggregatus* Gibbons.

Family SCORPÆNIDÆ.

10. *Sebastodes caurinus* (Richardson).

Family HEXAGRAMMIDÆ.

11. *Hexagrammus asper* Steller.
12. *Ophiodon elongatus* Girard.

Family COTTIDÆ.

13. *Chitonotus pugettensis* (Steindachner).

One specimen dredged.

14. *Icelinus strabo* Starks n. sp.

Head $2\frac{3}{4}$ in body; depth 4; D. IX-15; anal 13; eye 4 in head; maxillary $2\frac{2}{5}$; snout 4.

Body robust at shoulders, tapering into a rather slender caudal peduncle; upper profile of head evenly curved from snout to dorsal, the snout rather steep; mouth horizontal and placed at the extreme lower aspect of head; upper jaw projecting slightly beyond the lower; narrow bands of villiform teeth on jaws, vomer, and palatines; maxillary reaching about to posterior margin of eye.

Nasal spines prominent; upper spine of preopercle longer than eye, extending upward and backward, and bearing on its inner edge one or two antler-like processes; below it on edge of preopercle are two small spines, the upper rather blunt and not conspicuous, the lower longer and sharp, pointing downward and somewhat forward; on each side of occiput is a small blunt tubercle, a short dermal flap behind each eye, and one sometimes present behind each occipital tubercle.

Head naked; a band of scales along back, following dorsal outline, composed of two rows of scales for most of its length, but the posterior five or six scales are in a single row; the outer and anterior edge of each scale is embedded, the inner and posterior edge is strongly ctenoid, so the opposing edges of the rows are ctenoid edges; a single row of 37 scales along lateral line, the anterior ones rougher than the others.

Dorsal spines slender, the fins not connected; front of anal slightly nearer tip of snout than base of caudal; pectorals rather wide, reaching a little past front of soft dorsal.

Color olive-gray, with faint irregular darker cross-bars on back, the first under middle of spinous dorsal, the second under first fourth of soft dorsal, the third under last fourth of soft dorsal, indications of one on caudal peduncle, and a dark streak at base of caudal fin; sides and back mottled, under parts white; ventrals and anal white, other fins crossed with dark wavy lines,

This species is closely related to *Icelinus borealis*, differing from it in having a smaller eye, a stouter caudal peduncle, a slightly wider interorbital space, shorter barbels behind eye, the barbels at occiput not so constant in their presence, and in having the end of maxillary in a different relation to the eye.

The eye of *Icelinus borealis* is contained only three times in the length of the head in specimens of the same size as *Icelinus microps*, and the maxillary scarcely reaches past pupil. This comparison is based on specimens of *I. borealis* taken by the "Albatross" in the Straits of Fuca and in Bristol Bay, Alaska.

About twenty-five specimens taken near Port Ludlow with the dredge, the largest an inch and a half in length.

The types are in the collection of Leland Stanford Jr. University, bearing the number 5045.

15. *Triglops beani* Gilbert.

One specimen dredged.

16. *Artedius asperulus* Starks n. sp.

- Head $2\frac{3}{4}$ in body; depth 4; D. IX-16; A. 12; eye 4 in head; maxillary $2\frac{1}{3}$; snout 4.

Profile of head broadly rounded from tip of snout to occiput, the snout very steep; lower outline of head nearly horizontal, mouth at lower aspect of head little if any oblique; maxillary reaching to below middle of eye; villiform teeth on jaws, vomer, and palatines; nasal spines prominent, preopercular process short, bifurcate, the entire spine covered with skin; three small spines developed on edge of preopercle below it; top of head naked, with many mucous pores; interorbital space narrow, concave, its width about half eye. A wide band of strongly ctenoid scales along back, starting opposite front of spinous dorsal, and below it a distance equal to pupil, gradually running upward and nearly touching the base of soft dorsal, joining its fellow of the opposite side behind dorsal, and continuing on caudal peduncle to midway between last ray of dorsal and base of caudal; at its widest part, under front of soft dorsal, it is 9 scales wide in an oblique series; 33 oblique series in its length; lateral line armed with 35 ctenoid scales in a single series; all the scales are imbedded on their lower anterior edges and ctenoid on their upper posterior edges; naked area between lateral line and band of scales, at its widest part narrower than band of scales. Spinuous dorsal rounded in outline, not joined to soft dorsal; pectoral reaching to base of seventh or eighth ray of soft dorsal; ventrals reaching vent.

Color olive-brown, with four or five dark, irregular cross-bars on back, which break up and form reticula-

tions around white spots on sides; the lower of these spots form semicircles only where they run into the white of the belly. The first cross-bar is under front of spinous dorsal, the second is under front of soft dorsal, the third under posterior third of soft dorsal, the fourth indicated by a blotch on caudal peduncle; a dark streak at base of caudal fin; under parts white; ventrals and anal white, other fins crossed with undulating lines; lips dusky.

This species differs from *Artedius lateralis*, with which it seems to be most closely related, in having a wider and longer band of scales, and in other less important characters.

The types are three specimens about an inch and a half in length, which were dredged in the vicinity of Port Ludlow. They are in the museum of the Leland Stanford Jr. University, No. 5046.

Axyrias n. gen.

Top of head with patches of ctenoid scales and cirri. A band of very small scales below dorsals, and a single row of larger ones following the lateral line. Villiform teeth on jaws, vomer, and palatines. Preopercular spine short, very narrowly forked. Dorsals not connected. Gill-membranes united, free from the isthmus. No slit behind last gill. Ventrals 1, 3.

This genus seems to be related to *Artedius*, *Chitonotus* and *Astrolytus*. It differs from *Artedius* in the rough head and smaller scales, and from *Astrolytes* and *Chitonotus* in the single fork to the preopercular spine, and in the smaller scales.

(ἀξυρίας, one unshorn: ξυρίας, a shaveling.)

17. *Axyrias harringtoni* Starks n. sp. Plate lxxiv.

Head $2\frac{2}{3}$ in length of body; depth $4\frac{1}{5}$; dorsal IX-16; anal 12; eye 4 in head; maxillary $2\frac{1}{2}$.

Upper profile of head steep from tip of snout to above eyes, thence nearly horizontal; mouth at lower aspect of head, the jaws subequal; maxillary reaching to the vertical from pupil; villiform teeth on jaws, vomer, and palatines; eye set high in head, its diameter a little less than length of snout; interorbital space nearly concave, its width about half eye; upper preopercular spine short, its length about a third of eye, very narrowly bifurcate at tip, the forks very small; below it on edge of preopercle is a second spine, small and blunt, and a third scarcely developed; nasal spines prominent. Top of head and upper part of opercles with patches of ctenoid scales, a patch on posterior part of interorbital space and behind eyes, sending a narrow band backwards along each side of head above opercles, and a few in front of dorsal, leaving a seminaked area in front of occiput, which has a few scales scattered over it. Many cirri on top of head scattered among the scales, one above posterior edge of each eye, one over anterior edge of eye, two or three around edge of preopercle, one on end of maxillary, and one at each anterior lateral scale back to about middle of lateral line. A band of rough scales along back, about 7 scales wide anteriorly, and composed of about 47 oblique series; the scales obliquely imbedded, the upper posterior edges strongly ctenoid, the lower anterior edges imbedded. A naked area of nearly the same width as band between it and spinous dorsal, the band running upwards posteriorly and touching second dorsal at about its middle, running back and joining its fellow of the opposite side behind the second dorsal, and ending midway between base of last ray and base of caudal; a single row of 36 scales similar to the others following lateral line. Dorsal spines subequal from the first to the sixth or seventh, the fin not connected with soft dorsal,

which is about the same height as the spinous; pectoral rather large, reaching to the base of fourth or fifth dorsal ray; ventrals scarcely reaching vent; insertion of anal midway between middle of eye and base of caudal, its longest ray about equal to those of dorsal.

Ground color olive, with about five dark cross-bars on back; the first bar under middle of spinous dorsal, the second under front of soft dorsal, the third under its middle, and the fourth under its end, and the fifth is represented by a blotch on top of caudal peduncle; a dark streak at base of caudal fin; sides with many clear-cut, round, white spots, growing larger downwards; the lower row are only half spots where the white of the spot runs into the white on lower part of body; belly white; lips and under parts of head with dark olive-brown wavy bars of about the same width as the interspaces; fins with wavy dark streaks, except anal and ventrals which are white. Coloration very similar to *Artedius lateralis*.

The single type specimen was taken with the dredge in the vicinity of Port Ludlow. It is about two and a half inches in length. Numbered 5047 on the register of the museum in Leland Stanford Jr. University. I take pleasure in naming this species for President Mark Walrod Harrington of the University of Washington.

18. *Hemilepidotus hemilepidotus* (Tilesius).

19. *Acanthocottus polyacanthocottus* (Pallas).

Abundant; specimens were taken with the seine and set line. These specimens have a smaller eye and shorter preopercular spine than specimens from Alaska; but both of these characters are so variable that it does not seem possible to separate them.

The following is the fin formula of our specimens:

	1 specimen.	1 specimen.	6 specimens.	4 specimens.
Dorsal	viii-13	viii-14	ix-13	ix-13
Anal	11	11	11	12

	2 specimens.	3 specimens.	1 specimen.	1 specimen.
Dorsal	ix-14	ix-14	x-13	x-13
Anal	11	12	11	12

20. *Enophrys bison* (Girard).

21. *Leptocottus armatus* Girard.

22. *Oligocottus embryum* Jordan & Starks.

A few specimens were taken in the rock pools. The color was found very variable, as in related species, running from a grass green without distinct markings to those that are mottled and barred, as described in original description.

23. *Oligocottus borealis* Jordan & Snyder.

Very abundant in tide pools.

24. *Nautichthys oculo-fasciatus* (Girard).

A few specimens taken in the dredge.

25. *Blepsias cirrhosus* (Pallas).

Very abundant in the "eel grass," where specimens were secured.

26. *Ascelichthys rhodorus* Jordan & Gilbert).

A large specimen found under a rock on the shores of

Mats Mats Bay, and a small one dredged from moderately deep water.

Family PSYCHROLUTIDÆ.

27. *Psychrolutes paradoxus* Günther.

(*Psychrolutes zebra* Bean.)

First recorded last year from this locality, where a single small specimen was dredged. This year it was found to be extremely abundant, and was taken with the seine and dredge.

According to Dr. Boulenger, the original type of *P. paradoxus* agrees perfectly with our figure of *P. zebra*, and the two are not distinct.

Family RHAMPHOCOTTIDÆ.

28. *Rhamphocottus richardsoni* Günther.

A few small specimens taken with the dredge.

Family AGONIDÆ.

29. *Aspidophoroides inermis* Günther.

One specimen dredged.

30. *Pallasina aix** Starks n. sp. Plate lxxv.

Head from tip of snout 4 in body; depth $3\frac{1}{2}$ in head; dorsal VII-7; anal 11; pectoral 11; eye $5\frac{1}{3}$ in head.

Mouth rather oblique, the lower jaw much projecting; upper edge of maxillary slipping under preorbital for its whole length, its posterior end midway between tip of snout and middle of eye; villiform teeth on jaws and vomer, none apparently on palatines; lower jaw with a fleshy tip, scarcely produced into a barbel, scarcely as long as diameter of pupil; supraorbital rim prominent,

* $\acute{a}\acute{\iota}\acute{\zeta}$, a goat, from the pointed beard, or $\acute{a}\acute{\iota}\acute{\zeta}$, a darter from the slender form.

making the interorbital space deeply concave; width of the latter about two-thirds eye; two ridges from the inner edges of supraorbital rim run backward, and are continuous with dorsal ridges of body; edge of preopercle with three spines, the middle one the largest. Two large median plates in front of ventrals on breast, a row of plates along each lateral ridge of breast, a large plate on each side of the union between first and second median plates, and behind them a row of small plates irregular in size and position, sometimes continuous and interposed between median and lateral plates, and sometimes allowing the edges of median and lateral plates to touch; 11 or 12 plates in front of dorsal; spinous dorsal on 9 or 10 plates, counting to end of membrane; lateral line 43. Space between dorsal ridges strongly concave, the ridges coming together on caudal peduncle but not uniting, continuing parallel for a short distance and then becoming obsolete; upper lateral ridge ending anteriorly on about the twelfth plate from head. Last rays of dorsal and anal connected to the body by a membrane; space between dorsals about equal to the width of a plate; front of anal midway between posterior end of maxillary and base of caudal; pectoral reaching just past front of spinous dorsal; vent distant an eye's diameter from base of ventrals; length of caudal equal to head behind anterior ridge of pupil.

Color blackish, with fine punctulations; belly white; a light streak running backward from eye to upper edge of gill-opening; below this an area scarcely so wide as eye, darker than the rest of body, its lower edge sharply defined against the white under parts of head; chin black; dorsals and caudal dusky; pectorals light, the rays with many black spots which do not involve the membrane; ventrals and anal white.

This species differs from *Pallasina barbatus* in having a much shorter barbel on chin, in having two median plates in front of ventrals in place of three, and in having the plates between the median and lateral plates much smaller and less regular in arrangement. In *P. barbatus* these plates are about as large as the median plates and always interposed between them and lateral plates, the arrangement being constant. The abdominal ridges are generally closer together in *P. aiv* than in the northern species.

This species was taken with the seine in great abundance in Puget Sound, near Port Ludlow; the largest is nearly five inches in length, the others about three.

This type has been given the number 5040 on the register of the collection in the Leland Stanford Jr. University Museum.

31. *Podothecus acipenserinus* (Pallas).

Two small specimens obtained in the seine.

32. *Averruncus emmelane* Jordan & Starks.

A fine large specimen taken with the seine.

33. *Xystes axinophrys* Jordan & Starks.

Two specimens seined, about the same size as the single type specimen, $1\frac{1}{2}$ inches in length.

34. *Odontopyxis trispinosus* Lockington.

Rather common. A few specimens secured with the dredge.

Family LIPARIDIDÆ.

35. *Neoliparis fissuratus* Starks n. sp.

Head $3\frac{1}{4}$ in body; depth $4\frac{1}{2}$; dorsal VI-28; anal 26; pectoral 36; caudal 14; eye 7 in head; maxillary $2\frac{1}{6}$; ventral disk $2\frac{1}{2}$.

Body moderately elongate, not produced at nape; mouth rather large, the maxillary extending to below middle of eye; jaws subequal; teeth tricuspid, arranged in about 10 oblique series in each jaw; nostrils ending in short wide tubes; gill-openings wider than in any other known *Neoliparis*, commencing a distance above pectoral about equal to the diameter of eye, ending about opposite the fourteenth ray; ventral disk a little longer than wide, its distance from chin equal to one and a half its longest diameter, its posterior edge about the same distance from front of anal; vent nearer anal than ventral disk, its distance from anal equal to half ventral disk. Origin of spinous dorsal at the vertical from midway between vent and ventral disk; dorsal scarcely joined to caudal, anal very slightly; front of anal nearer chin than base of caudal by a distance equal to ventral disk; pectoral rather short and wide, reaching to opposite front of anal, the lower lobe very narrow and long, much longer than upper lobe, but not reaching so far posteriorly on account of the oblique position of the fin; tip of lower lobe reaching to vent; length of caudal $1\frac{3}{5}$ in head.

Color dusky, darker above, sides with five punctulations, belly and under parts of head except chin white; lips dusky; dorsals and anal darker than body; pectoral dusky at base, the lower lobe dark; caudal crossed with wavy dark lines.

This species differs from the other species in this genus in having a wider gill-opening, and in minor characters.

The single type specimen was taken with the dredge, in the vicinity of Port Ludlow; it is $2\frac{1}{4}$ inches in length. It bears the number 5044 on the register of the Leland Stanford Jr. University collection.

36. *Liparis dennyi* Jordan & Starks.

One specimen dredged.

37. *Liparis fucensis* Gilbert.

Three specimens dredged.

38. *Liparis pulchellus* Ayres.

Three small specimens taken with the dredge.

Family GOBIESOCIDÆ.

39. *Caularchus mæandricus* (Girard).

Family XIPHIDIONTIDÆ.

40. *Pholis ornatus* (Girard).41. *Apodichthys flavidus* Girard.

Obtained in great abundance with the seine from among the *Fucus*. No specimens seen in the rock pools.

42. *Anoplarchus atropurpureus* (Kittlitz).43. *Xiphistes chirus* Jordan & Gilbert.44. *Xiphidion rupestre* (Jordan & Gilbert).45. *Xiphidion mucosum* Girard.

Family STICHÆIDÆ.

46. *Lumpenus anguillaris* (Pallas).

A few large ones taken. The young of this species was one of the most abundant taken with the seine.

Family GADIDÆ.

47. *Microgadus proximus* (Girard).

Family PLEURONECTIDÆ.

48. *Lepidopsetta bilineata* (Ayres).49. *Platichthys stellatus*.